**TREE STUDY**
**INDOOR LAB**

**Materials:** Get the following materials from your instructor/assistant:
- "Key" to Trees
- Cones, needled branches, leaves and wood slab
- Tape measure
- Clinometer
- Safety glasses

**Directions:** Using the "Key" to determine each cone/leaf/needled branch. ***A point for each correct identification.***

1. _____ (1 pt.)_____
2. _____ (1 pt.)_____
3. _____ (1 pt.)_____
4. _____ (1 pt.)_____
5. _____ (1 pt.)_____
6. _____ (1 pt.)_____
7. _____ (1 pt.)_____
8. _____ (1 pt.)_____
9. _____ (1 pt.)_____
10. _____ (1 pt.)_____

**Using the clinometer and safety glasses, how high is the wall in this room?**

_____ (5 pts.)_____

**If you have correctly identified the above you may continue:**

If a tree is 100 feet high and 50 years old, on average how high did it grow each year?
  Show your work: (5 pts.)_____

*Hint:* $\dfrac{Height}{Age}$ *= average growth each year*  _____

If the tree is 120 inches around (circumference), what is its thickness (diameter)

(5 pts.)_____

*Hint:    diameter = 2 X radius*

_____

*radius = $\dfrac{circumference}{6.28}$*

How old was the above tree when it was cut down? _____ **(5 pts.)**_____


**Now check the tree cross-section (harvested in 2013) at the front of the room and answer the following questions:** **(5 pts.)**_____
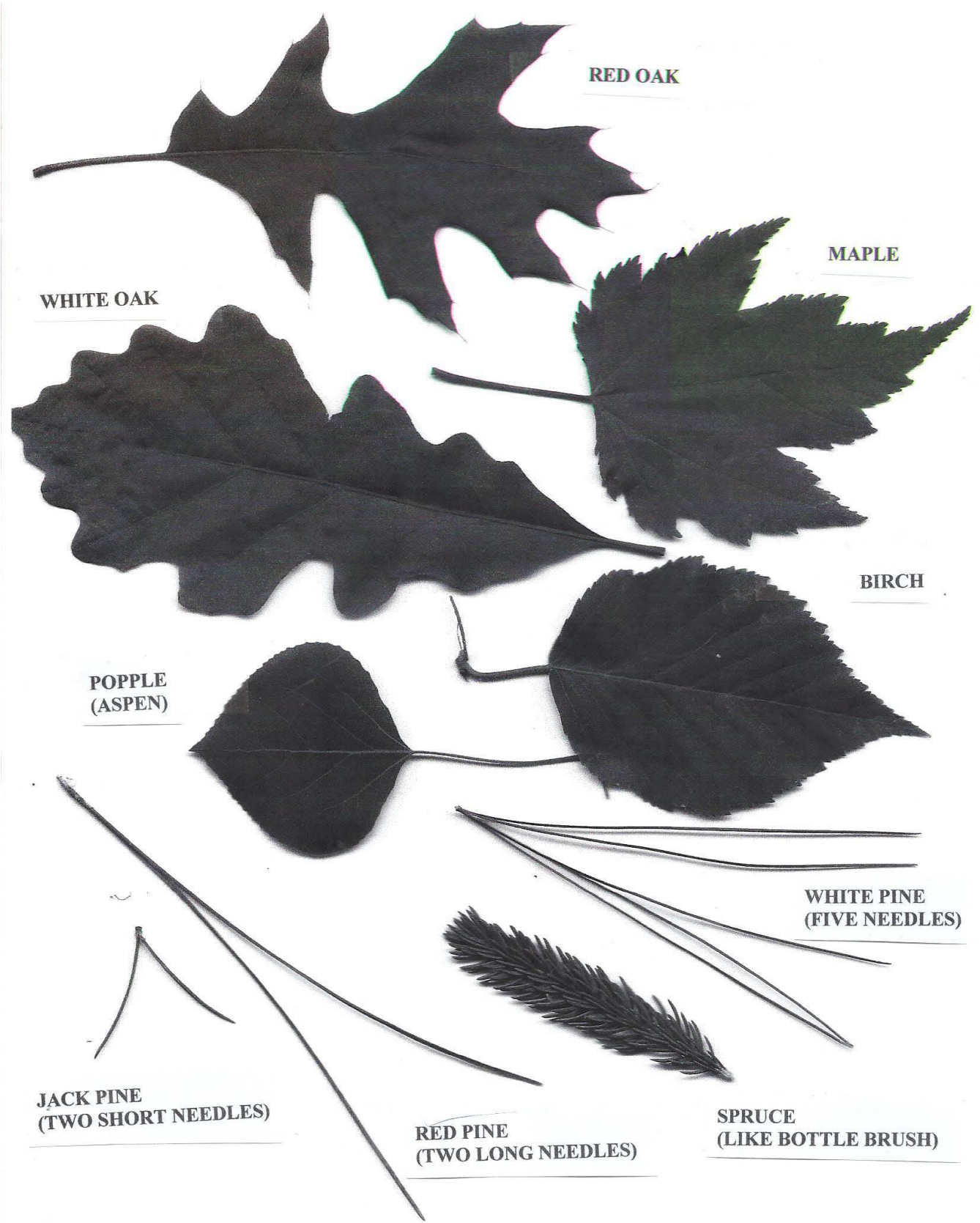1. How old was the tree when it was cut down? _____
2. What was the tree's best growing year? _____
3. When did it grow the slowest/least? _____

**List 5 ways trees benefit lakes, rivers, wetlands and lake animals** **(5 pts.)**_____
1.

2.

3.

4.

5.

**TOTAL TREE POINTS** **(40 pts.)** _____

WHITE PINE

RED PINE

SPRUCE

JACK PINE
(OPEN)
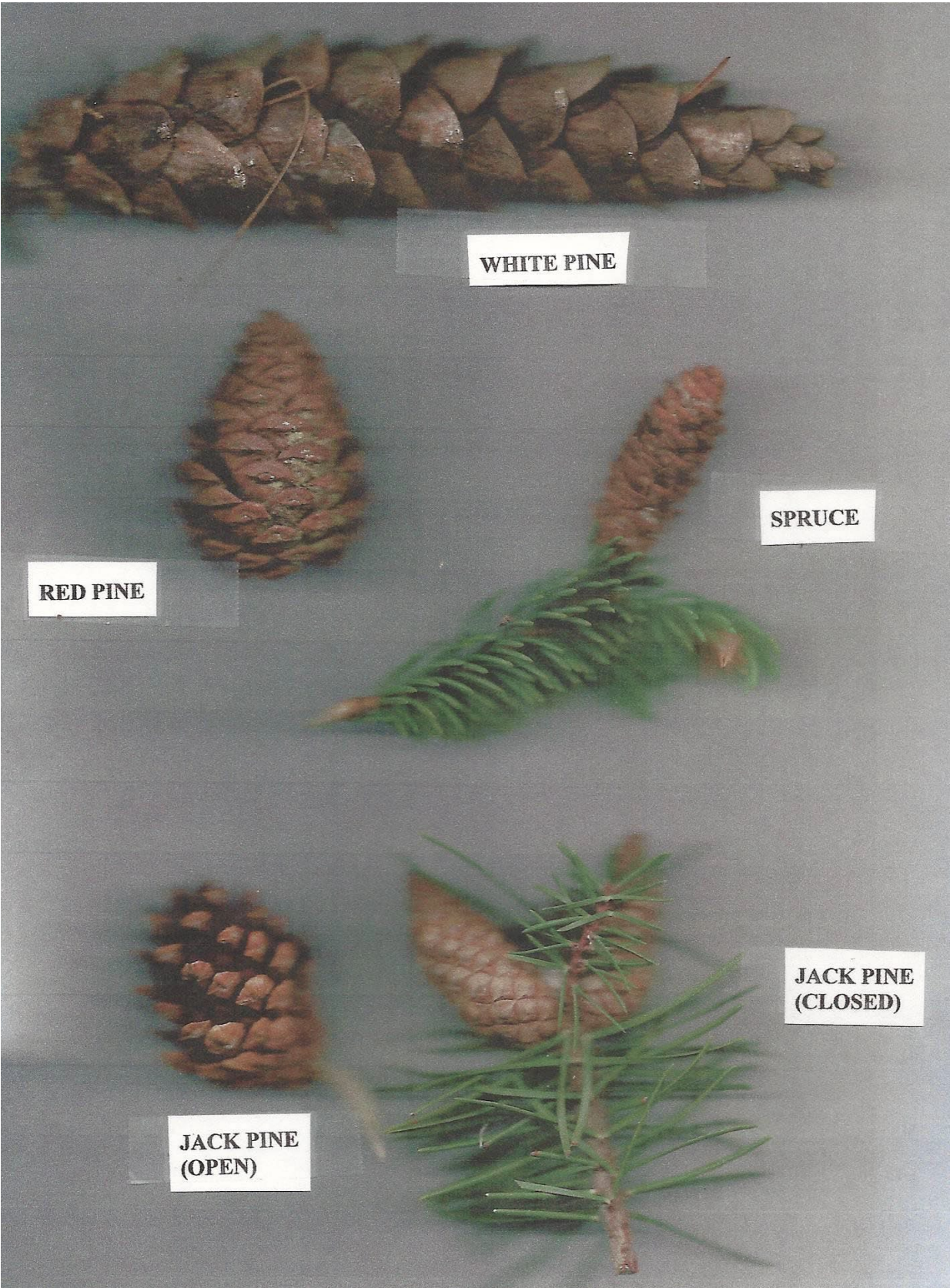
JACK PINE
(CLOSED)

RED OAK

MAPLE

WHITE OAK

BIRCH

POPPLE
(ASPEN)

WHITE PINE
(FIVE NEEDLES)

JACK PINE
(TWO SHORT NEEDLES)

RED PINE
(TWO LONG NEEDLES)

SPRUCE
(LIKE BOTTLE BRUSH)

# HOW TO USE THE CLINOMETER

The clinometer is used to measure the "slope" of a hill or the height of objects, like trees. Here is what you will need and how to use the instrument to measure the height of an object (tree) selected by your instructor.

Equipment:
- Safety glasses
- Clinometer
- Measuring tape/meter stick
- Tongue depressor/stick
- Pencil and this lab

Directions:

**You will need three people:  One to use the clinometer, one to watch the pendulum level and one "spotter" to make sure nobody gets hurt while moving about and to mark sites.**

- **First person** stands about as far from the object (tree) as it is "high." Then puts the *safety glasses* on and looks through the *blue* tube at the top of the object (tree) while keeping the base (bottom) level. Carefully move back and forth until you see the top of the object (tree) and the second person tells you the bottom of the triangle is level.
- **Second person** watches the *wire pendulum* making sure it is free to spring and straight down and parallel to the line on the triangle. The bottom of the triangle is then level.
- **Third person** marks designated sites and watches the first person so he/she does not stumble while moving and looking through the blue tube.
- Once the top of the object (tree) has been sighted while keeping the clinometer level, the spotter marks the spot on the ground with the stick.
- First person now looks through the *white tube* while keeping it level and the spotter marks the spot on the object (tree). Measure the distance to the object (tree) and the mark on the ground and add the distance from the mark on the object (tree) to the ground. This will be the height of your object (tree).



A + B = HEIGHT